

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1, 3-8, 10-12 and 14-22 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the Tool and Manufacturing Engineers Handbook in view of Mori and Nomura. Claims 1, 3-8, 10-12 and 14-22 remain active.

Considering first then the Examiner's objection to the Abstract of the Disclosure as attempting to incorporate material in the specification by reference to a foreign patent, it is to be noted that a review of the Abstract fails to indicate any reference to a foreign patent. In this regard, it is presumed that the Examiner intended to make reference to the Field of Invention where such incorporation by reference appears. In response thereto, appropriate amendments have been made.

Next considering then the rejection of Claims 1, 3-8, 10-12 and 14-22 under 35 U.S.C. § 103 as being unpatentable over the Tool and Manufacturing Engineers Handbook (hereinafter "the Handbook") in view of Mori and Nomura, it is noted that the Examiner has commented that he interprets the web thickness as being the equivalent of the diameter of the core 14 as illustrated in Figure 3. Assuming the same to be equivalent, the Examiner has further concluded that the diameter O of core 14 is the equivalent of section B-B in Figure 9-30 of the Handbook and further states that the same feature corresponding to diameter O in Figure 3 of the present invention is the equivalent of the chisel edge length shown in Figure 9-30. The Examiner further states that the chisel edge length as defined in Figures 9-30 is disclosed as being from 0.0D-0.50D in Figure 9-31 "where the variables such as torque and thrust are affected by up to a 0.25 inch core diameter for a 1/2-inch drill". It is respectfully submitted, however, that the Handbook discussion and figures mentioned above do not

support teaching results of adjusting core diameter to be in a range of 0.0D to 0.50D as mentioned above. Rather, Table 9-9 only specifies a web thickness percentage of drill diameter of from 11% to 30% and contains no suggestion that a higher percentage is possible. More particularly, there is no suggestion whatsoever that a core diameter ratio or a web thickness in the claimed range of 0.38D to 0.42D in Claim 1 is even possible. Furthermore, such contains no suggestion whatsoever as to the advantages of providing a core diameter ratio of the type claimed nor does such recognize the difficulties which exist when a core diameter range either below the claimed range or above the claimed range exists. To the contrary, the present invention specifies at page 7, lines 15-23:

As shown in Fig. 1 and Fig. 3, the land portions 10 and 10 are separated by the pair of chip discharging grooves 6, 6. A diameter of a core 24 in the middle of the land portions 10 and 10 is in the range of 0.38D to 0.42D, in which D is the cutting edge diameter representing the distance between the peripheral ends of the cutting edges 8, 8. When the core diameter is smaller than 0.38D, the flexural rigidity of the main body 2 will be reduced. When the core diameter is larger than 0.42D, the depth of the chip discharging grooves 6, 6 will be small and the space therein will be insufficient, so that the chips will clump inside the chip discharging grooves 6, 6, increasing the cutting force. As a result, fracture and wearing of the cutting edges 8 and 8 will occur. Accordingly, there will be problems in that the cutting accuracy will be degraded and the tool life will be reduced in either case.

In view of the foregoing, it is submitted that Applicants have explained the criticality of the claimed range noted above and have explained in detail the fact that the Handbook contains no teaching or suggestion utilizing a core diameter ratio outside the range noted above. In this regard, it is to be noted that it has been held that a prior art reference must be considered as a whole including those portions which might lead away or teach away from the invention. Panduit Corp. v. Dennison Manufacturing Co., 810 F.2d 1561, 1568 (Fed. Cir. 1987). In addition, insofar as the Examiner is using Applicants' teaching of critical range in which to provide the core diameter ratio, it is to be noted that it is improper to view prior art

references with the benefit of hindsight afforded by the patent application. In re Paulsen, 30 F.3d 1475 (Fed. Cir. 1994).

In view of the foregoing discussion, the importance of the core diameter ratio claimed is believed to be readily understandable. It is further noted in this regard that the Handbook does not teach the above-noted limitation and instead only discusses web thickness at page 9-15 and pages 9-42, 43 (and illustrates the same in Figure 9-26) which shows that the web thickness differs from core diameter ratio claimed and instead makes reference to a chisel thickness as explained at page 9-43. Because the chisel edges are non-cutting portions of drill points, the web thickness is made as thin as possible, consistent with adequate structural strength. The approximate web thickness is near the point of the drills as presented in Table 9-9. It is noted, however, that the web thickness is, as illustrated in Figure 9-26, the distance between the two drill points and thus differs from the core diameter 14 illustrated in Figure 3 of the present application, and as discussed at page 7 of the application as being the diameter between the middle of land portions 10, 10. In this regard it is further noted that Mori takes a web ratio as 15-23% (i.e., the ratio of the diameter of the web to drill diameter, as discussed at column 1, lines 50-68 which is also outside Applicants' claimed range and which measures a different dimension than that referred to in the present application). In view of this, it is submitted that since corresponding limitations regarding the core diameter have been added to each of independent Claims 1, 6, 7, 16 and 17 all such claims now merit indication of allowability. In view of the limitations set forth and each of the claims dependent from such independent claims, it is submitted that such dependent claims also merit indication of allowability.

Applicants submit that in view of the different structure and functioning of Mori and Nomura as compared with the structure shown in the Handbook, such references would not

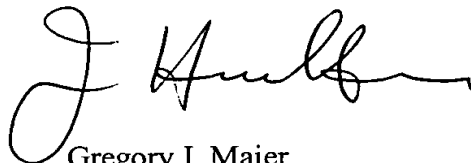
be obviously combinable with the Handbook and, even if so combined, would not result in Applicants' claimed invention. Accordingly, in view of this and in view of the additional limitations set forth in each of the claims dependent from Claim 1 and the other independent claims containing the above-noted language, it is submitted that such claims also merit indication of allowability.

Applicants further note that a declaration by the inventors is being prepared for the purpose of supporting the criticality of the limitations emphasized above in this amendment. Should the examiner believe that such is needed to help place the application in condition for allowance, the Examiner is requested to defer action until such declaration has been filed by being hand-carried to the Examiner's Technology Group 3711. If the Examiner has any questions in this regard, the Examiner is invited to call Applicants attorney, James Hamilton, to discuss this matter.

In view of the foregoing and in view of the fact that no amendments have been made to the claims, entry of this Amendment After Final Rejection is believed to be in order and the same is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
James D. Hamilton
Attorney of Record
Registration No. 28,421



22850

Tel.: (703) 413-3000
Fax: (703) 413-2220
GJM:JDH\la
I:\atty\JDH\205279us-am2.wpd

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IN THE SPECIFICATION

Please replace paragraph [0001] on page 1 as follows:

[0001] The present invention relates to hole forming tools such as drills, etc., suitable for forming holes in hard steels of which the hardness is, for example, higher than 40HRC. [This specification is on the basis of Japanese Patent Applications (Japanese Unexamined Patent Application Publication No. 11-244120, No. 2000-004058, No. 2000-093834, and No. 2000-099648), and the disclosures of these Japanese Patent Applications are incorporated herein as a part of this specification by reference.]

Please replace paragraph [0008] on page 3 as follows:

[0008] When the point angle is smaller than 125° , vibration easily occurs, especially in the [ease] case of cutting a hard steel. In addition, a time [Interval] interval will be long in which the cutting edges are not completely led into a work material and in which the cutting is unstable. When the point angle is larger than 135° , the hole forming tool cannot smoothly penetrate into the work material. In either case, the fineness of the formed hole will be degraded.

Please replace paragraph [0009] on page 3 as follows:

[0009] By setting the point angle in the range of 125° to 135° , the time interval in which the cutting is unstable is reduced. In addition, the hole forming tool may smoothly penetrate into the work material. Accordingly, [the] degradation of the fineness of the formed hole is

prevented. In addition, according to the present invention, the hole forming tool may have one or more of the following characteristics.

Please replace paragraph [0012] on page 3 as follows:

[0012] By setting the groove width ratio in the range of 0.9 to 1.1, [the] clumping of the chips due to the lack of space is prevented, and sufficient rigidity of the hole forming tool is ensured. Accordingly, the fineness of the formed hole is maintained and breakage of the hole forming tool is prevented.

Please replace paragraph [0016] on page 3 as follows:

[0016] According to a third characteristic, [a] the helix angle of the chip discharging grooves may be in the range of 5° to 15°.